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CANADIAN FARM FUEL AND FERTILIZER: PRICES AND EXPENSES

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Prepared by:
Farm Income and Inputs Section
Farm Economic Analysis Division
Research and Analysis Directorate
Strategic Policy Branch
Agriculture and Agri-Food Canada

Canada

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Fax: 204-983-5524
Email: bulletin@agr.gc.ca

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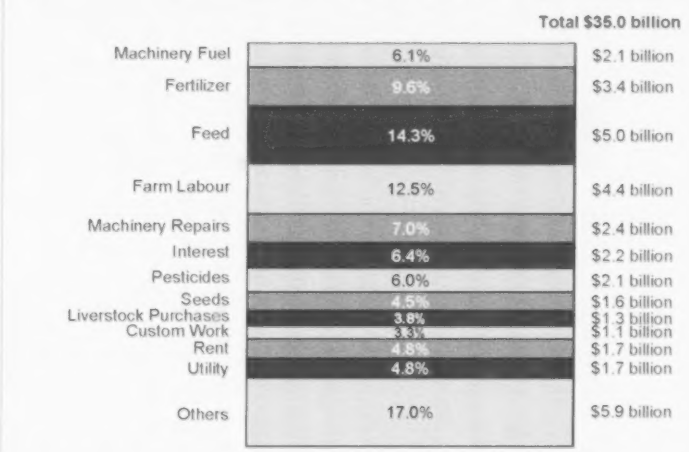
CANADIAN FARM FUEL AND FERTILIZER: PRICES AND EXPENSES

This issue of the Market Outlook Report examines the situation and outlook for farm fuel and fertilizer prices and expenses in Canada for 2011-2012. Expenditures for fuel and fertilizers represented about 16% of farm operating expenses in Canada in 2010. Prices of fuel for farm machinery increased in 2011 and are forecast to do so again in 2012. After two consecutive annual decreases, fertilizer prices resumed their climb in 2011 and will continue to rise in 2012.

SUMMARY

Primary production and profitability in the agricultural industry are highly dependent upon fuels and fertilizers. ***Figure 1*** shows the components of 2010 Canadian farm operating expenses[1]. Fuel and fertilizer costs accounted for 16% of total Canadian farm expenses, or $5.5 billion (G). For every one cent per litre increase in fuel prices, Canadian farmers' annual machinery fuel bill is up by about $27 million (M). For fertilizer, every one cent per kilogram increase in the price adds about $61M to Canadian farmers' annual fertilizer bill.

Figure 1 CANADA: FARM OPERATING EXPENSES, 2010



Sources: (1) Statistics Canada; (2) AAFC calculations.

Fuel prices increased by 123% between 2003 and 2008, but the global economic recession caused demand for energy to weaken and fuel prices to fall in 2009. However, fuel prices started to rise again in 2010 and continued this trend over 2011 because of growing energy demand in emerging economies and slowing growth in supply.

Fertilizer prices in Canada rose steadily starting in 2003, but increased sharply to reach an historical high in 2008. These increases abruptly halted in 2009 as a result of falling commodity prices, restricted availability of credit, and a sudden fall in energy prices. However, fertilizer prices resumed their climb in 2011 and will continue to increase in 2012 in response to high energy prices and strong

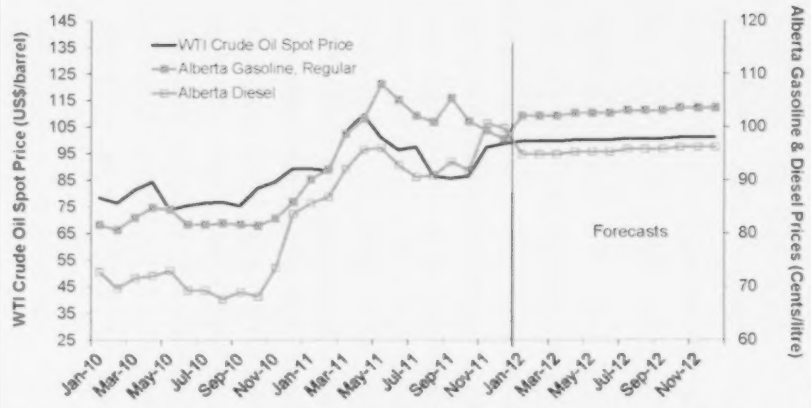
[1] (i) Rent includes cash rent and share rent; (ii) Utility expenses include electricity, telephone and heating oil; (iii) Other expenses include taxes, repairs to building and fences, irrigation, twine & wire, crop insurance premiums, artificial insemination fees & veterinary, business insurance, stabilization premiums, legal and accounting fees, and miscellaneous expenses.

worldwide fertilizer demand driven by rising crop prices.

FARM MACHINERY FUEL

Farm machinery fuel expenses consist mainly of diesel and gasoline, but also include lubricants. The price of fuel is generally determined by the forces of global supply and demand, and the agricultural sector is largely a price taker for both diesel and gasoline.

Figure 2 ALBERTA AND UNITED STATES: ENERGY PRICES



Sources: (1) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (2) United States Energy Information Administration (EIA); (3) Forecast from EIA and AAFC.

FUEL PRICES

The Canadian agricultural sector relies heavily on petroleum to meet a variety of energy needs. Canadian fuel prices closely follow the US energy prices. ***Figure 2*** shows the actual and forecasted energy price pattern in the US and Canada over 2010-2012. The West Texas Intermediate (WTI) crude oil price averaged about US$95 per barrel in 2011, 20% higher than in 2010.[2] Agriculture and Agri-Food Canada (AAFC) estimates that the prices paid by Canadian farmers for farm machinery fuel increased by 25% in 2011 from 2010. This translated into a $534M increase in Canadian farmers' machinery fuel bill for 2011.

The oil market is expected to tighten through 2012 due to growing energy demand in emerging economies and slowing growth in supply. The US Energy Information Administration (EIA) projects the price for WTI crude oil to average US$100 per barrel in 2012, up 6% from the 2011 average. Both diesel and gasoline prices in 2012 are projected to remain at around the same level as in 2011 in the US[3]. Based on the information available up to January 2012, AAFC expects that fuel prices for farm machinery in Canada will increase by about 3% in 2012 compared to 2011. However, if global economic growth rebounds faster than expected, fuel demand could experience stronger growth and fuel prices could as a result increase more significantly in 2012.

FARM FUEL USAGE

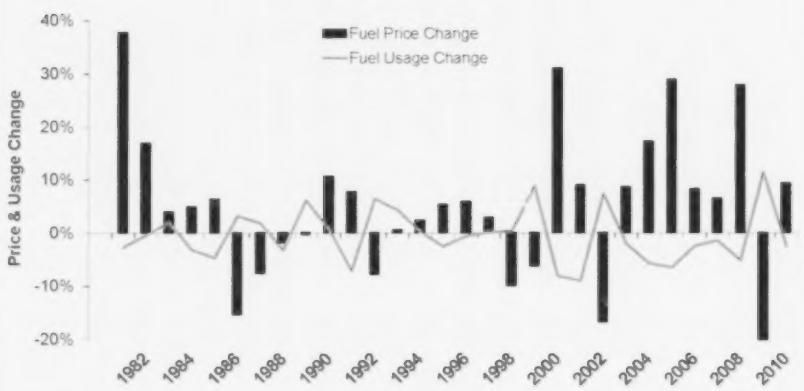
Elasticity is estimated by economists to gauge the responsiveness of demand or supply to changes in the price of a product. Using 30 years of historical data from Statistics Canada, the elasticity of demand for the price of fuel in Canada was estimated at -0.21. This means that, on average, when fuel prices rose 10% Canadian farmers reduced fuel usage by 2.1%. Farmers' demand for fuel is relatively insensitive to price changes in the short-term because fuel is a necessity for farming and there are no immediate substitutes for fuel. ***Figure 3*** illustrates the inverse relationship between fuel price and fuel usage over 1981-2010.

Figure 4 indicates that before 2000, farmers' long-term fuel usage was actually quite steady, averaging a 0.5% annual growth rate, with no significant variability in fuel prices. However, the volume of fuel used by farmers decreased by an average of 2% annually following a string of continuous hikes in fuel prices over 2000-2010. Therefore, although

[2] Estimated by the US Energy Information Administration (EIA) in January, 2012.
[3] EIA, January 2012.

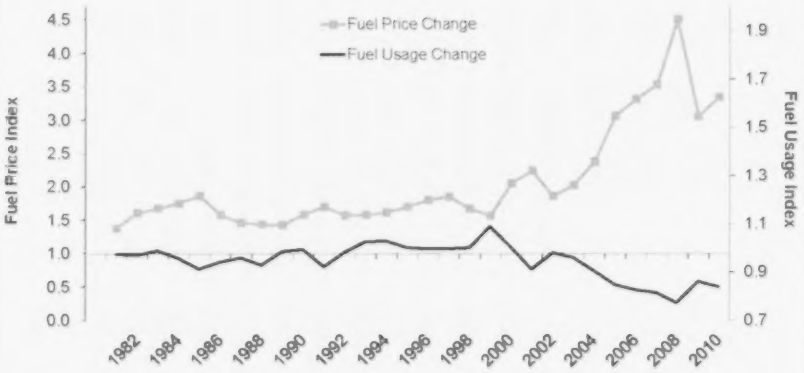
higher fuel prices may reduce farmers' fuel usage in any given year, the increase would have to persist for a longer period of time in order to reduce the fuel consumption trend. In response to higher fuel prices, farmers alter their techniques of production by, for example, choosing more efficient tractors, combines and other farm equipment to reduce tillage, or reducing the number of passes across fields by combining operations to save fuel.

Figure 3 CANADA: FARM MACHINERY FUEL PRICE AND USAGE CHANGES FROM PREVIOUS YEAR



Sources: (1) Statistics Canada and AAFC; (2) AAFC calculations.

Figure 4 CANADA: LONG-TERM TRENDS IN FARM MACHINERY FUEL PRICE AND USAGE (BASE YEAR=1980)



Sources: (1) Statistics Canada and AAFC; (2) AAFC calculations.

Given the estimated elasticity and other factors such as seeded and harvested area, Canadian farm machinery fuel usage declined by 3% in 2011. In 2012, AAFC projects Canadian farm machinery fuel usage will increase by 2% as a large area of unseeded acreage due to flooding in the Prairies in 2011 returns to production.

FARM FUEL EXPENSES

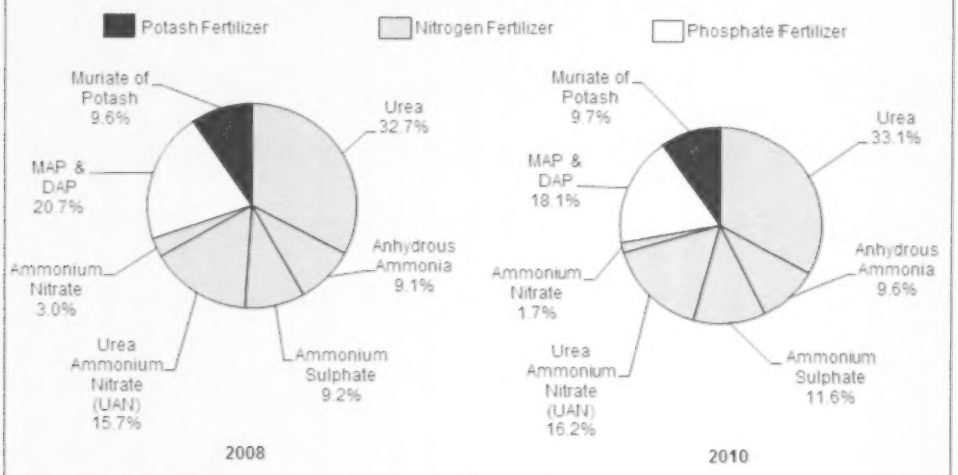
Given the change in both price and quantity, Canadian farm machinery fuel expenses were about $2.6G in 2011, an increase of 21% over 2010 and above the 2006-2010 average of $2.2G. Total expenses for farm machinery fuel are forecast to increase by 5% to $2.7G in 2012.

FARM FERTILIZERS

Canada is one of the world's major producers of fertilizer, particularly nitrogen and potash. Canada exports about 84% of its potash production and about a quarter of its nitrogen production, mainly to the US. Production is primarily located in Alberta and Saskatchewan.

Figure 5

CANADA: FERTILIZER TYPES AND USAGE, 2008 AND 2010



Sources: (1) Canadian Fertilizer Institute; (2) Statistics Canada; (3) AAFC calculations

FERTILIZER TYPES IN CANADA

Fertilizer contains three key nutrients: nitrogen, phosphate and potassium. The nitrogen fertilizers that are currently used in Canadian agriculture are primarily anhydrous ammonia, urea, nitrogen solution, ammonium nitrate and ammonium sulphate. The phosphate fertilizers are mono-ammonium phosphate (MAP) and di-ammonium phosphate (DAP), both produced from phosphate rock. The other major nutrient used in crop production is potash fertilizer, which is important in soybean and corn production. The majority of potash production in North America is in Saskatchewan.

Figure 5 shows the usage of major types of fertilizers in Canadian agriculture in 2008 and 2010. Nitrogen fertilizers were the largest nutrient used in agricultural production, accounting for 72% of total fertilizer usage, or about 4.2 million tonnes in 2010. The usage of nitrogen increased by an annual growth rate of 5% from 2008 to 2010, with urea representing the largest volume used. Phosphate fertilizers accounted for 18% of total fertilizer usage, or about 1.1 million tonnes. Potash fertilizer accounted for 10% of total usage, or about 0.6 million tonnes in 2010.

DETERMINATION OF FERTILIZER PRICES

The traditional components of determining fertilizer prices are production costs, market demand and competition. However, other factors, such as exchange rates and government policies, also have an effect on fertilizer pricing.

Production Costs

Anhydrous ammonia is the primary component in nearly all the nitrogen fertilizer produced in the world. Ingredients for the production of anhydrous ammonia are air, natural gas and steam, with natural gas accounting for 70-90% of the production cost of ammonia. Therefore, nitrogen fertilizer prices would be expected to be very responsive to changes in natural gas prices. ***Figure 6*** illustrates that nitrogen fertilizer prices generally track natural gas prices and that higher natural gas prices directly impact nitrogen fertilizer prices.

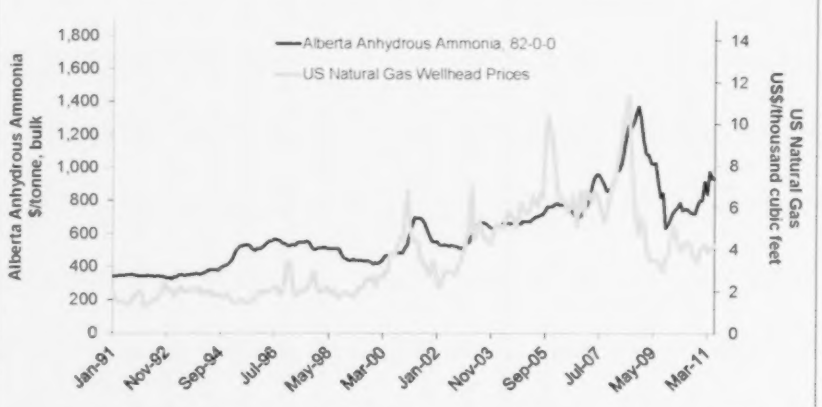
The correlation between the price of natural gas and the price of nitrogen fertilizer was estimated at 0.74 based on monthly data over 1991-2010. However, this relatively tight relationship has not always been the case. For example, in the mid-1990s strong fertilizer demand, in combination with near full industry capacity utilization, kept fertilizer prices high despite low natural gas prices. Therefore, when the supply is unable to keep up with the

demand, nitrogen prices can move independently of the price of their natural gas feedstock.

Ingredients for the production of phosphate fertilizers (MAP and DAP) are phosphate rock, sulfur and ammonia. ***Figure 7*** shows how increased phosphate rock and sulfur prices had profound implications on phosphate fertilizer prices over the period 2002-2010. Although the prices of phosphate rock and sulfur generally remained flat with no significant variability until 2006, markets began to tighten in 2007 and their prices reached a peak in 2008. This dramatic increase of the raw material price significantly drove up phosphate fertilizer prices during 2007 and 2008. However, the increase reversed itself in 2009, resulting in falling phosphate fertilizer prices.

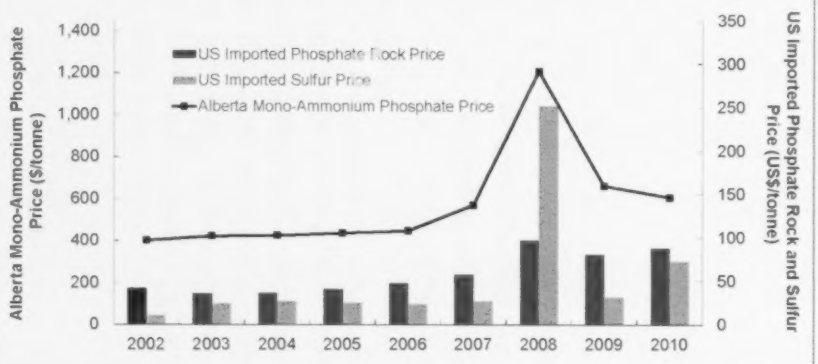
Besides production cost, the price of fertilizer at the retail level is also affected by prices for gasoline and diesel because transportation costs represent an important part of the cost of marketing fertilizer.

Figure 6 ANHYDROUS AMMONIA & NATURAL GAS PRICES



Sources: (1) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (2) United States Energy Information Administration.

Figure 7 MONO-AMMONIUM PHOSPHATE, PHOSPHATE ROCK & SULFUR PRICES



Sources: (1) Alberta Agricultural Input Monitoring System (AIMS), Alberta Agriculture and Food, Economics and Competitiveness Division, Statistics and Data Development Unit; (2) The United States Geological Survey; (3) US Census Bureau data as adjusted by US Geological Survey and PentaSul North America Sulphur Service; (4) AAFC calculations.

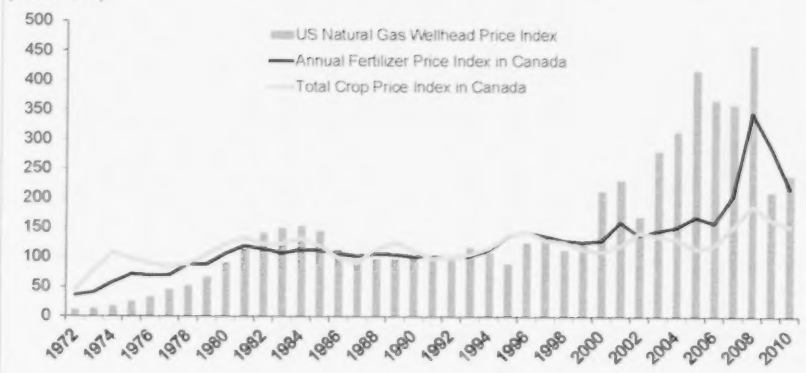
Market Demand

As in the case of fuel, fertilizers are internationally traded commodities and their prices are determined by global supply and demand factors. The world demand for agricultural commodities is rising, driven by growing populations, increased demand for meat, and strong government biofuel initiatives. This rising demand has increased agricultural commodity prices, which has in turn led to higher profit margins for farmers and has enabled them to increase fertilizer usage to boost yields as a means of

increasing production. The resulting increased demand for fertilizer in recent years has substantially driven up fertilizer prices. ***Figure 8*** shows how fertilizer prices responded to agricultural commodity prices in Canada.

Figure 8

PRICE MOVEMENT FOR FERTILIZER, CROPS AND NATURAL GAS



Sources: (1) Statistics Canada; (2) United States Energy Information Administration; (3) AAFC calculations.

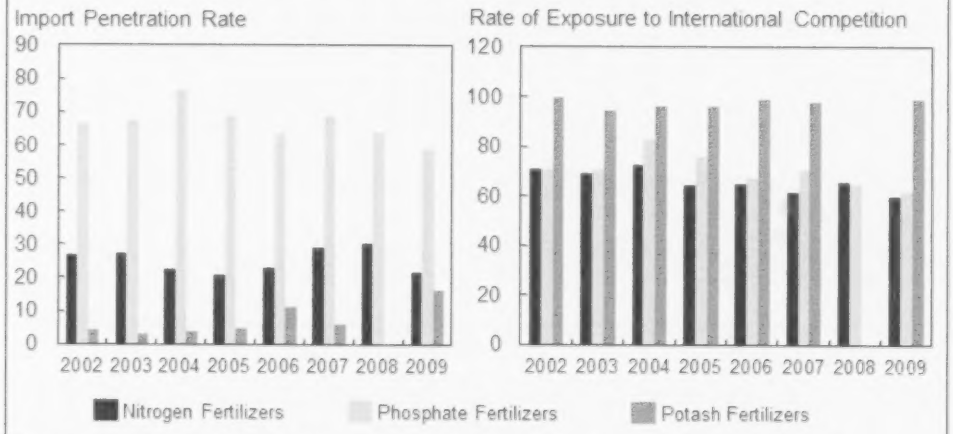
Fertilizer prices in Canada generally moved in tandem with agricultural commodity prices in most of the years over 1972-2010. For example, strong world demand for fertilizer, supported by favorable crop prices, drove fertilizer prices to historical highs in Canada in 2008. Nevertheless, this direct relationship has sometimes been more than offset by effects of interactions with natural gas prices. For example, in 2005, strong natural gas prices pushed fertilizer prices high despite low commodity prices. Conversely, in 2002, weak natural gas prices kept fertilizer prices low in spite of high commodity prices.

Competition

Canada is one of the world's major exporters of fertilizer, but also an important importer. In 2009, Canadian fertilizer exports represented 85% of production while imports accounted for 31% of domestic fertilizer consumption. The largest portion of Canadian fertilizer exports are destined for the US while most of the fertilizer imports are also from the US. With increasing globalization and market liberalization, Canadian fertilizer production targeted at domestic markets experiences competition from imports. Meanwhile,

Figure 9

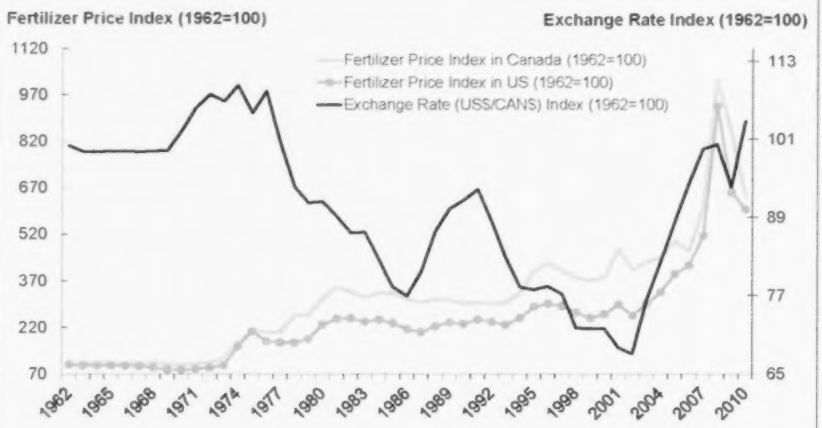
MEASURES OF EXPOSURE TO FOREIGN COMPETITION FOR THE CANADIAN FERTILIZER INDUSTRY



Sources: (1) Food and Agriculture Organization of the United Nations, FAOSTAT database; (2) AAFC calculations.

Canadian fertilizer exports also face international competition in global markets. ***Figure 9*** presents the measures of exposure to foreign competition for the Canadian fertilizer industry over 2002-2009.

Figure 10 FERTILIZER PRICES AND CANADIAN EXCHANGE RATES



Sources: (1) USDA National Agricultural Statistics Service (NASS); (2) Statistics Canada; (3) AAFC calculations.

The import penetration rates[4] show the high magnitude of foreign competition within the domestic market faced by Canadian phosphate fertilizer producers. Meanwhile, Canadian nitrogen fertilizer producers confronted relatively little foreign competition, and potash producers faced almost no foreign competition as the domestic market was supplied almost exclusively by domestic production. When domestic and global markets are considered together, the rates of exposure to international competition[5] show that Canadian potash producers were exposed to the highest level of foreign competition, followed by phosphate fertilizer producers.

Canadian fertilizer prices reflect a balancing of several factors. Given foreign competitors within domestic and global markets, Canadian fertilizer suppliers have little choice but to match the market price in order to establish a market share. However, with high concentration in the Canadian fertilizer industry, there could be upward pressure on prices due to the interdependency among a small number of firms. In addition, the strength of export fertilizer associations, such as the US Phosphate Chemical Export Association and CANPOTEX in Canada, the world's largest exporter of potash, also has a strong influence in setting fertilizer prices in global markets.[6]

Other Factors

Canadian dollar exchange rates also have an effect on fertilizer pricing as Canadian fertilizer prices either rise or decline to the level of import prices to remain competitive. ***Figure 10*** illustrates that Canadian fertilizer prices seem to capture long-run movements in Canadian dollar exchange rates. Apparently, an appreciation of the Canadian dollar has had a beneficial impact on fertilizer prices for Canadian farmers. For example, when the Canadian dollar depreciated between 1975 and 1986, Canadian farmers paid more for fertilizer purchases as fertilizer prices in Canada increased faster than in the US. Conversely, Canadian farmers made relative savings when the Canadian dollar appreciated over 2003-2008 as US fertilizer prices rose at a greater pace.

Besides exchange rates, government trade policies in major fertilizer exporting and importing countries can influence fertilizer prices in global markets. For example, with short global supplies of fertilizers, higher

[4] Import Penetration Rate = imports/consumption×100.

[5] Rate of Exposure to International Competition = (exports/production + (1-exports/production)x (imports/consumption))×100.

[6] Wen-yuan Huang, February 2009, "Factors Contributing to the Recent Increase in U.S. Fertilizer Prices, 2002-08", United States Department of Agriculture.